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Job No.: CTCE/BBMP/WNo.10/KAK/WMM/Gradation/2016-17

13.06.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Client : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **K. Anil Kumar,**
84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.

Name of Work : Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout i Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016

Date of Testing : 13.06.2016

Material : WMM

Sample ID : WMM Layer

Oven Dry Wt (gm): **7530**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	280	280	3.7	96.3	95-100
22.4	2525	2805	37.3	62.7	60-80
11.2	1215	4020	53.4	46.6	40-60
4.75	925	4945	65.7	34.3	25-40
2.36	875	5820	77.3	22.7	15-30
0.600	785	6605	87.7	12.3	8-22
0.075	565	7170	95.2	4.8	0-8

Assistant Executive Engineer
Vidyaranyapura Sub Division
BBMP, Bangalore - 97

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Bangalore-560079.

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Job No.: CTCE/BBMP/WNo.10/KAK/WMM/Gradation/2016-17 13.06.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Client : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **K. Anil Kumar,**
84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.

Name of Work : Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016

Date of Testing : 13.06.2016

Material : WMM

Sample ID : WMM Layer Oven Dry Wt (gm): **7810**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	215	215	2.8	97.2	95-100
22.4	2685	2900	37.1	62.9	60-80
11.2	1350	4250	54.4	45.6	40-60
4.75	1020	5270	67.5	32.5	25-40
2.36	900	6170	79.0	21.0	15-30
0.600	750	6920	88.6	11.4	8-22
0.075	600	7520	96.3	3.7	0-8

Assistant Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore-97

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Job No.: CTCE/BBMP/WNo.10/KAK/WMM/Gradation/2016-17 13.06.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Client : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **K. Anil Kumar,**
84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.

Name of Work : Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016

Date of Testing : 13.06.2016

Material : WMM

Sample ID : WMM Layer Oven Dry Wt (gm): **8875**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	345	345	3.9	96.1	95-100
22.4	2750	3095	34.9	65.1	60-80
11.2	1410	4505	50.8	49.2	40-60
4.75	1365	5870	66.1	33.9	25-40
2.36	1015	6885	77.6	22.4	15-30
0.600	985	7870	88.7	11.3	8-22
0.075	655	8525	96.1	3.9	0-8

Assistant Executive Engineer
Vidyaranyapura Sub Division
BBMP, Bangalore - 97

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Job No.: CTCE/BBMP/WNo.10/KAK/WMM/AIV/2016-17 13.06.2016

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
Name of the Work	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Sample ID	WMM Layer
Type of Mix	Wet Mix macadam
Date of Testing	13.06.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	379	381	
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	79	82	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	299	
4	Aggregate Impact value = percent fines $100^* (W_2/W_1)\%$	20.84	21.52	21.18

Assistant Executive Engineer Vidyaranyapura Sub Division BBMP, Bangalore-97

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CTCE/BBMP/WNo.10/KAK/WMM/AIV/2016-17 13.06.2016

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
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Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Sample ID	WMM Layer
Type of Mix	Wet Mix macadam
Date of Testing	13.06.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	381	385	
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	83	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	298	299	
4	Aggregate Impact value = percent fines	21.78	22.34	
	$100^* (W_2/W_1)\%$			**22.06**

Assistant Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore-97

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
Name of the Work	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Sample ID	WMM Layer
Type of Mix	Wet Mix macadam
Date of Testing	13.06.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	386	389	
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g.	86	90	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	299	
4	Aggregate Impact value = percent fines	22.28	23.14	
	$100^* (W_2/W_1)\%$			22.71

Assistant Executive Engineer
Vidyaranyapura Sub Division
BBMP, Bangalore - 97

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CTCE/BBMP/WNo.10/KAK/WMM/S-T/2016-17 13.06.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore-75.
Name of Work	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Sample ID	WMM Layer
Date of Testing	13.06.2016

Result : Flakiness Index = **11.53%**

Elongation Index = **13.61%**

Result : Combined Flakiness & Elongation index 25.14%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

Note:

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Assistant Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore-97

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Job No.: CTCE/BBMP/WNo.10/KAK/WMM/S-T/2016-17 13.06.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore-75.
Name of Work	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Sample ID	WMM Layer
Date of Testing	13.06.2016

Result : Flakiness Index = **11.79%**

Elongation Index = **13.47%**

Result : Combined Flakiness & Elongation index 25.26%

Comments:

- Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Assistant Executive Engineer
Vidyaranyapura Sub Division
BBMP, Bangalore - 97

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E-mail : vishwanath.ia@civiltechconsultants.com / info@civiltechconsultants.com

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Job No.: CTCE/BBMP/WNo.10/KAK/WMM/S-T/2016-17 13.06.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore-75.
Name of Work	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Sample ID	WMM Layer
Date of Testing	13.06.2016

Assistant Executive Engineer Vidyaranyapura Sub Division BBMP Bangalore - 97

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Result: Flakiness Index = **11.92%**

Elongation Index = **13.52%**

Result: Combined Flakiness & Elongation index 25.44%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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T-2377

Job No.: CTCE/BBMP/WNo.10/KAK/CSR-07/081b/QB(SDBC)/2016-17 02.07.2016

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
*AGENCY	:	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
*NAME OF THE WORK	:	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	:	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
*SAMPLE ID	:	Semi Dense Bituminous Concrete
DATE OF SAMPLING	:	01.07.2016
DATE OF TESTING	:	02.07.2016

The results of the tests conducted on the bitumen sample for Semi Dense Bituminous Concrete.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	68	60 to 70
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	53	Min. 45
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 50
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	282	Min. 220

*Information is furnished by the Customer/Representative.

Assistant Executive Engineer Vidyaranyapura Sub Division BBMP Bangalore - 97

Note:

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Jadha

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VISHWANATH. I.A.
Chief Executive Officer

#23/14, 7th Cross, 3rd Stage, 4th Block, Shakthi Ganapathi Nagara, Basaveshwaranagar, Bangalore-79.
Tele Fax : 23223227, Website : www.civiltechconsultants.com
E-mail : vishwanath.ia@civiltechconsultants.com / info@civiltechconsultants.com

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Job No.: CTCE/BBMP/WNo.10/KAK/SDBC/AIV/2016-17 02.07.2016

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
Name of the Work	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	02.07.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	380	383	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	81	84	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	296	297	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	21.32	21.93	**21.62**

Assistant Executive Engineer, Vidyaranyapura Sub Division BBMP, Bangalore-97

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/WNo.10/KAK/SDBC/AIV/2016-17 02.07.2016

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
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Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	02.07.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	385	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	83	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	296	297	
4	Aggregate Impact value = percent fines $100^* (W_2/W_1)\%$	21.73	22.34	**22.03**

Assistant Executive Engineer Vidyaranyapura Sub Division BBMP, Bangalore - 97

Civil-Tech Consultants & Engineers Bangalore

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Aggregate Impact Value

IS: 2386 Part IV

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Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	02.07.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	384	387	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	85	88	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	296	297	
4	Aggregate Impact value = percent fines $100*(W_2/W_1)$%	22.14	22.74	22.44

Assistant Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore - 91

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Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/WNo.10/KAK/SDBC/Shape_T/2016-17 02.07.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
Name of Work	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	02.07.2016

Result : Flakiness Index = **11.23%**

Elongation Index = **13.45%**

Result : Combined Flakiness & Elongation index **24.68%**

Comments:

- Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Assistant Executive Engineer
Vidyaranyapura Sub Division
BBMP, Bangalore - 97

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Job No.: CTCE/BBMP/WNo.10/KAK/SDBC/Shape_T/2016-17 02.07.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
Name of Work	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	02.07.2016

Result : Flakiness Index = **11.58%**

Elongation Index = **13.61%**

Result : Combined Flakiness & Elongation index **25.19%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
Name of Work	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	02.07.2016

Result : Flakiness Index = **11.85%**

Elongation Index = **13.49%**

Result : Combined Flakiness & Elongation index **25.34%**

Comments:

1. Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/WNo.10/KAK/SDBC/Stripping/2016-17 05.07.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
Name of the work	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	05.07.2016

Type of binder : 60/70

Percentage of binder used : 5.0% by wt.

Total weight of aggregate : 200 g

Total weight of binder : 10.0 g

Temperature of water-bath : 40° C

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Vidyaranyapura Sub Division
BBMP, Bangalore City

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.1	2.98	97.02
2	3.3		
3	3.5		

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Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95 %

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Job No.: CTCE/BBMP/WNo.10/KAK/SDBC/Sp_Wa/2016-17 05.07.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
Name of the Work	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	05.07.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2023	2023	2025	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1273	1273	1275	
4	Weight of saturated surface dry aggregate in air	W_3 g	2043	2046	2049	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	770	773	774	
6	Weight of oven dried aggregate	W_4 g	2028	2032	2037	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.634	2.629	2.632	2.631
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.686	2.677	2.673	2.679
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.74%	0.69%	0.59%	0.67%

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Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/WNo.10/KAK/SDBC/Bitumen/2016-17 05.07.2016

BITUMEN DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC : SP : 11 - 1984

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
NAME OF THE WORK	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
SAMPLE I/D	Roads in Chamundeshwari Layout, Ward No. 10
DATE OF TESTING	05.07.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475	474
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25.00	26.00
7. Bitumen content in %	5.00	5.20
8. Average	**5.10**	

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Job No.: CTCE/BBMP/WNo.10/KAK/SDBC/Gradation/2016-17 05.07.2016

GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS : 2386 and IRC : SP : 11 - 1984

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
NAME OF THE WORK	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
SAMPLE I/D	Roads in Chamundeshwari Layout, Ward No. 10
DATE OF TESTING	05.07.2016

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	25.83	5.44	5.44	94.56	90-100
4.75	251.47	52.94	58.38	41.62	35-51
2.36	52.15	10.98	69.36	30.64	24-39
1.18	50.14	10.56	79.91	20.09	15-30
0.3	29.68	6.25	86.16	13.84	9-19
0.075	34.25	7.21	93.37	6.63	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	31.89	6.73	6.73	93.27	90-100
4.75	257.74	54.38	61.10	38.90	35-51
2.36	54.28	11.45	72.55	27.45	24-39
1.18	43.12	9.10	81.65	18.35	15-30
0.3	26.98	5.69	87.34	12.66	9-19
0.075	31.82	6.71	94.06	5.94	3-8

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Job No.: CTCE/BBMP/WNo.10/KAK/SDBC/AGG/2016-17 05.07.2016

Aggregate Gradation Test

IS : 2386 Part I

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
Name of the Work	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	05.07.2016

Total Weight of Sample: **5615** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	426	7.6	7.59	92.41	90-100	
4.75	3128	55.7	63.29	36.71	35-51	
2.36	592	10.5	73.84	26.16	24-39	
1.18	473	8.4	82.26	17.74	15-30	
0.3	365	6.5	88.76	11.24	9-19	
0.075	251	4.5	93.23	6.77	3-8	

Assistant Executive Engineer Vidyaranyapura Sub Division BBMP, Bangalore-97

Total Weight of Sample: **5755** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	367	6.4	6.38	93.62	90-100	
4.75	2958	51.4	57.78	42.22	35-51	
2.36	626	10.9	68.65	31.35	24-39	
1.18	459	8.0	76.63	23.37	15-30	
0.3	362	6.3	82.92	17.08	9-19	
0.075	628	10.9	93.83	6.17	3-8	

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Job No.: CTCE/BBMP/WNo.10/KAK/SDBC/Stability/2016-17 05.07.2016

TEST REPORT ON STABILITY OF MIX

Client	:	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	:	**K. Anil Kumar,** # 84-L, 2nd Floor, 3rd Cross, 4th Main, HAL 3rd Stage, Thippasandra, Bangalore - 75.
Name of the work	:	Improvements to roads and drains at 3rd, 4th and 5th Main Road Chamundeshwari Layout in Ward No. 10, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	:	BBMP/EE/BTP/WO/36/2016-17 Dated: 20.05.2016
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Semi Dense Bituminous Concrete
Date of Testing	:	05.07.2016

The results of the tests conducted on the bituminous mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-16)
1	Marshal Stability, at 60° C, Kn	10.15	9.25	8.2 Kn (min)
2	Marshal flow at 60° C, mm	2.10	3.45	2 – 4
3	Percent air voids	3.85	4.30	3 – 5
4	Percent voids in mineral aggregates (VMA %)	14.70	13.25	13 - 15
5	Percent voids filled with Bitumen (VFB %)	69.55	70.10	65 – 78
6	Density, g/cc	2.26	2.25	---

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